

Forces and Motion

5-5 The student will demonstrate an understanding of the nature of force and motion. (Physical Science)

5-5.4 Explain ways to change the effect that friction has on the motion of objects (including changing the texture of the surface, changing the amount of surface area involved, and adding lubrication).

Taxonomy level: 2.7-B Understand Conceptual Knowledge

Previous/Future knowledge: Students have not been introduced to the concept of friction in previous grade levels. Students will further develop the concept of friction in 8th grade (8-5.3)

It is essential for students to know that friction is a force produced when objects are in contact with each other. Friction is a force that acts against motion. The following variables influence the affect of friction:

Texture of the surface

- *Rough surfaces* tend to create more friction.
- *Smooth surfaces* tend to create less friction.

Amount of surface area

- The amount of surface area affects the friction between objects in liquids and gases.
- The amount of surface area affects the friction on a moving object under the following circumstances: air resistance (such as the size of a parachute) or the resistance of an object as it glides through water (such as a boat).
- The amount of surface area in contact usually does not affect friction between two solids.

Lubrication

- *Lubrication*, for example oil or grease, reduces the effects of friction.
- Without lubrication, moving parts of machines would slow down or stop very quickly.

It is not essential for students to know why these factors affect friction.

Assessment Guidelines:

The objective of this indicator is to *explain* ways to change the effects of friction on the motion of objects; therefore, the primary focus of assessment should be to construct a cause-and-effect model of the ways to change the effects of friction on motion including those listed in the indicator. However, appropriate assessments should also require students to *recognize* factors that affect friction; *illustrate* a diagram of objects moving to determine which factors are increasing friction to slow down or stop the motion; *summarize* major points about the factors that affect friction with their increasing or decreasing the effects; *infer* which factors are increasing or decreasing friction to slow down or speed up the motion of objects.